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BALANCING THE SCALES OF JUSTICE

U. S. PATENT OFFICE
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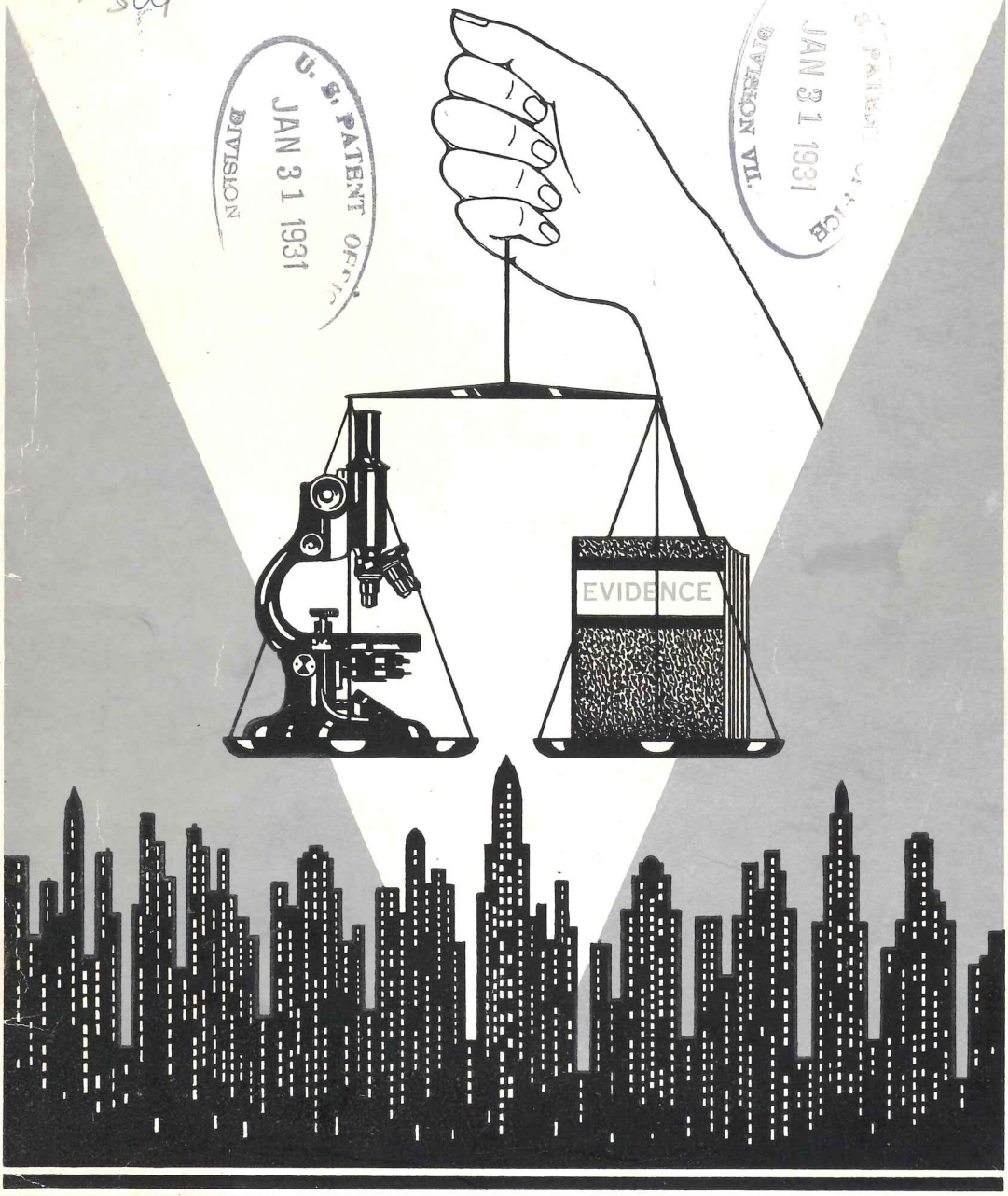

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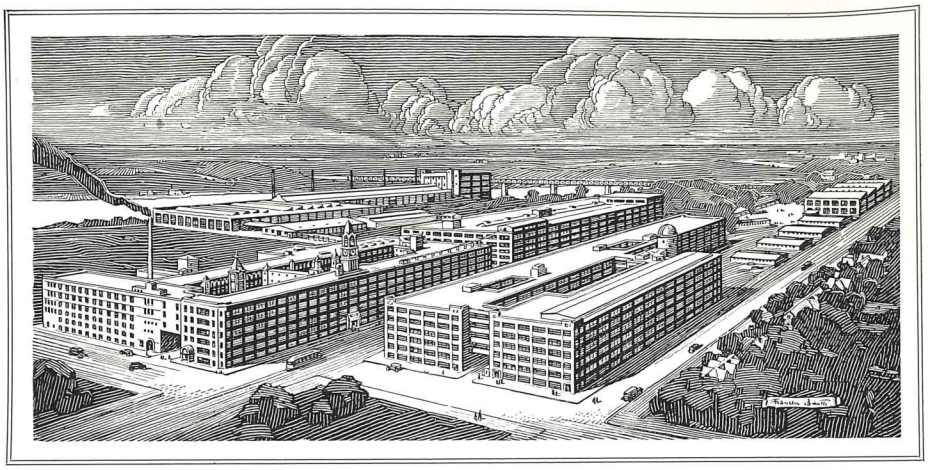

THE B & L Glass Plant, the Scientific and Technical Bureaus, the Chemical Laboratory, the Research Staffs, and many other highly specialized and skilled divisions are housed in the enormous plant of the Bausch & Lomb Optical Company at Rochester, N. Y. Each has a share in making every instrument conform to the high B & L traditions of quality.

Optical Instruments *for* Criminological Research

BAUSCH & LOMB OPTICAL CO.
ROCHESTER, NEW YORK

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Scientific Sleuthing*

by RANSOME SUTTON

NOT to be outdone by the city police research laboratory, Sheriff William I. Traeger last year established a criminological research laboratory, and it has since been running in high. It is in charge of Capt. W. J. Bright and a young scientist, F. B. Gompert, and it works in connection with the homicide detail. If money saved is money earned, this laboratory is a profitable asset. Its cost for a series of tests, for example, amounted to only $81.59 as against a total of $644.50 previously paid to private laboratories for similar work. While paying its way, it has already unearthed the evidence which convicted a number of murderers, and without its work these particular criminals could hardly have been convicted.

Take the "torso case." In this case the identity of the mutilated body was established by a microscopic examination of four hairs found in the brushes of the murdered woman's carpet sweeper. Having identified the victim, it took the Sheriff's sleuths only a short time to track down the killer.

According to Mr. Gompert, this laboratory has perfected the first system ever devised for classifying human hair. "There are 21,870 different varieties of hair," he says, "and by use of numbers, composed of five figures, a hair can be described and differentiated from all other hairs, and by writing the number on a sticker the history of the hair can be preserved for all time. Hairs from different heads differ in many respects, such as color, shape, pattern, pigmentation, texture, cuticular scale and so on; so, if we find a hair at the scene of a crime and then find the same identical kind of a hair on a suspect's head, the probabilities are about a million to one that the suspect was present in person—unless, of course, the suspect was framed."

Ropes, it seems, are often used in the commission of crimes—as in the Hickman case. The laboratory has, therefore, worked out a system for classifying rope, cords and twine; likewise for classifying types of paper and dried blood stains.

"Since the establishing of the laboratory," Gompert declared, "there has been only one unsolved murder mystery in this county."

Reprinted by courtesy of Los Angeles Times

The Fourth

By GEO. R. SALISBURY

THE well known "third degree" has always been the ally of police. In this article is presented what we call the "fourth degree." Crime detection is placed on a scientific basis—the microscope searches for and produces evidence which tends to produce conviction. Thus "John Law" is given another arm to fight the criminal.

In recent years the radical increase in the size of our criminal problems has provoked a great deal of thought among the sociological societies and the lay public as well. It seems as though every psychologist, criminologist, sociologist, penal commission and police department, even lunch clubs, and the Wednesday afternoon sewing circles have not only adopted the problem as their very own, but have suggested solutions which would, if adopted, according to the originators, eliminate crime.

To this writer it does not make a great deal of difference whether the cause is the prohibition law, some of the known or unclassified mental diseases, unemployment, too slack or too harsh laws, for the condition still seems to increase. The result is apparent. While no reasonable person could deny that the solution lies, first, in the establishment of the cause, and second, its remedy, we cannot help but humbly suggest that possibly one of the best immediate deterrents is the establishment in the would-be culprit's mind the certainty of apprehension. In order to develop this particular phase of the criminal problem, the instruments of many sciences have been borrowed and adopted.

In a brief article of this type it is only possible to discuss one type of these instruments — those used as visual aids, i. e., optical equipment. Of this last group we shall select the most important — the microscope. Generally speaking, the microscope is used in the examination and classification of the following main types of materials and conditions to establish their significance and relation to a case.

Blood and Other Stains
Location, classification, age, etc.

Ballistics
Calibre, type of arm, bullet structure, shells, firing pins.

Messages
Handwriting, type faces, codes, typewriting, anonymous letters, etc.

Miscellaneous
Knives, fabrics, identity of living and dead, chemicals, fingerprints, etc.

In this narrowing process we might just as well limit the type of criminal activity to a single classification—

*Reprinted from the "Educational Focus"

Degree

homocide. The reader can readily see how the same technique could be applied in the examination of evidence and clues relating to lesser crimes, but the most vicious crime will probably have the greatest reader interest.

At the scene of a crime of this nature there are often stains varying in color from a bright scarlet or crimson to a deep reddish brown. The extent and the location of these stains, of course, vary, and it is sometimes impossible to tell their exact nature. For instance, rust has often been mistaken for blood, as have many acid stains and other miscellaneous residues from liquids. Animal bloods have often been interpreted as evidences of violent human death, but by the aid of the microscope it can be determined, not only whether it is actually blood or not, but whether it is human blood. Furthermore, medical science has reached the point where it can identify positively the characteristic properties in mammalian blood.

In Figure 1 some typical samples of blood crystals are given, and it will be apparent, even to the most casual observer, by their structural features that a difference exists.

In Figure 2 the blood corpuscles of the mammalia and the ovipara are compared. Of course, the examination of blood without a microscope is hopeless. When certain accessories, such as a filar micrometric eyepiece, are added and a mechanical stage, there is little doubt that much more definite conclusions can be reached. For instance, the diameter of human blood corpuscles is from 1/3092 to 1/3500 of an inch, while those of an opossum, next in size, will vary between 1/3145 and 1/3557. The relative diameter of commonly encountered corpuscles gradually diminishes in size in the order given: Guinea pig, dog, rabbit, rat, mouse, pig, cat, ox, horse, sheep, goat. (The last mentioned corpuscles' width being 1/5225 to 1/6369 or less than one-half the width of a human

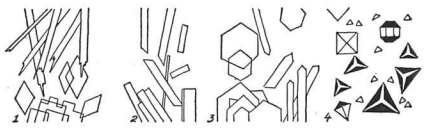


Fig. 1—Haemoglobin Crystals

1. *Man.*
2. *Partially schematic drawing of typical Carnivora.*
3. *Squirrel.*
4. *Mouse.*

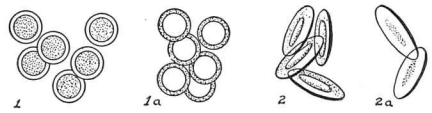


Fig. 2—Mammalia and Ovipara Blood Corpuscles Compared

1, Mammalia corpuscles sharply focused; 1a, same slightly within the focus; 2, Ovipara corpuscles sharply focused; 2a, Ovipara corpuscles showing the increased pariphenial transparency caused by acetic acid. (Note also the emphasional nucleated structure.)

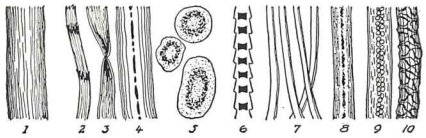


Fig. 3—Hairs and Fibres

1, Horse; 2, ox; 3, cotton; 4, human; 5, human cross sections (child); 6, mouse; 7, silk; 8, human (child); 9, human; 10, wool.

These specimens are shown to indicate typical structural differences apparent under microscopic observation. The reader, however, is cautioned against accepting the above for authorative comparisons, as the qualities of such hairs and fabrics vary according to age, conditions to which exposed, area of body or source of specimen from which selected, et al.

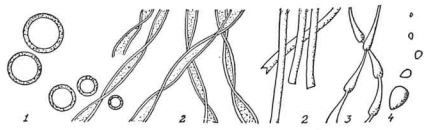


Fig. 4—Typically Agglomerated Field

1. *Air bubbles.*
2. *Cotton fibres.*
3. *Feather.*
4. *Oil globules.*

corpuscle and, incidentally, more striking when areas are considered).

Oftentimes blood stains are mixed up with other stains, and they must be carefully segregated before any definite conclusions can be reached. In fact, it is usually the most exceptional case in which these stains are not indiscriminately mixed with other foreign substances with which they happen to come in contact. By the natural order of things at the time the crime is committed, the criminal cannot control where the victim's blood will fall and the victim does not care. The investigator's problem is often deliberately augmented by attempts on the perpetrator's part to eradicate these evidences. A particular instance which may be of interest to the reader in illustrating this point was a murder case in Mississippi. The man disappeared under unusual circumstances and a neighbor, dropping in to console the woman in the case, found her shellacking the kitchen floor. Suspicion being aroused at the wide gap between the mental response a woman is supposed to feel when her husband disappears and the prosaic action in observation of the kitchen floor suddenly needing attention prompted the sheriff, upon hearing of the incident, to enter the house in the absence of the family and scrape a little of the shellac and crack filling from various places in the floor. Despite the fact that the floor had been carefully washed and bleached with oxalic acid before being shellacked, several specimens yielded human red corpuscles of no great state of deterioration. This substantiating proof that further investigation was justifiable led to the discovery of the body and the ultimate conviction of the wife.

In the matter of the examination of hairs and staples of fabric the microscope is absolutely indispensable.

In Figure 3 we have presented enough specimens to clearly establish the difference in types of hair, which, if compared with Figure 4, will show the structural difference between animal hairs and plant fibers, and also the identifying features within the species.

It is almost impossible for a person committing a crime to eliminate traces of his crime when he is not aware of their existence. That is to say, he cannot be expected to wash from a garment the blood that cannot be detected by his unaided visual scrutiny any more than he can be expected to pick a bit of hair or fiber from his clothing that is not visible

under ordinary methods of examination. These telltale clues are quite as elusive to the prying eyes of law and order as they are to the committer of the crime. In fact, if he were not hurried by time, his greater incentive would probably enable him to retrace his actions, skilfully covering up and obliterating each clue, to the extent that it would be practically impossible to find adequate traces to build up a case.

If this particular type of crime be further subclassified to that of shooting, we have in the majority of instances a bullet left in the body of the victim. The bullet, casually examined by the unaided eye, merely discloses its calibre, but under the microscope it becomes a very definite link, possessing characteristics and peculiarities that stamp it with an absolute individuality. Its identity may be far more positive than any of the many questionable factors which are now accepted as evidence establishing the identity of an individual.

In Figure 5a, a composite picture of these accidental identifying lines is shown. This picture was taken simultaneously through two microscopes, one focused on the "nose" end and the other the "heel" end of a .32 bullet. The comparison eyepiece is used to bring these two images into such continuity that the lines will retain their interlocking distinctiveness. This part of the apparatus is merely a prism arrangement which brings the two images formed at the regular eyepieces of the microscope to one single eyepiece and bisects the circular field, visible in such a way that the right hemisphere represents the right half field of the right microscope and the left hemisphere the left half field of the left microscope. By a mechanical stage manipulation the corresponding areas of two bullets can be perfectly aligned. Then, by rotating the two specimens about their longitudinal axes, it can quickly be determined whether one bullet possesses the identical characteristics in the same sequence as the other.

Fig. 5b shows two finger prints photographed through this comparison microscope.

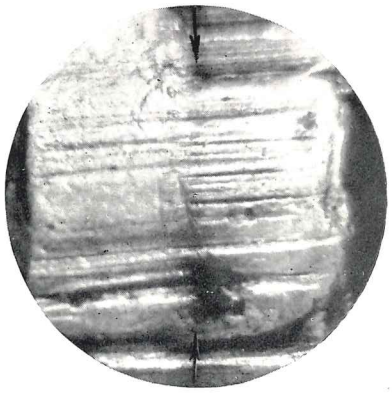
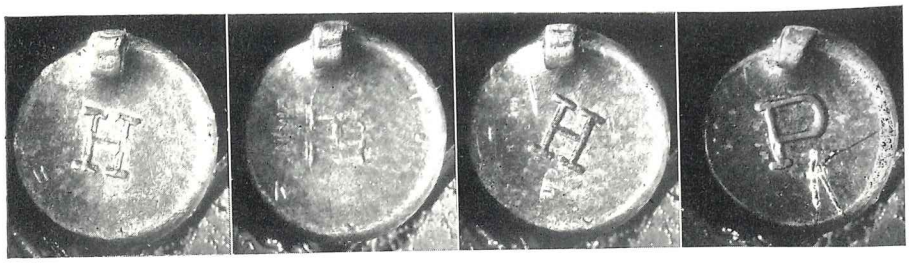


Fig. 5a

Two .32 cal. bullets photographed through the comparison apparatus.

Fig. 5b

Two fingerprints photorgaphed through the comparison apparatus.



1 2 3 4

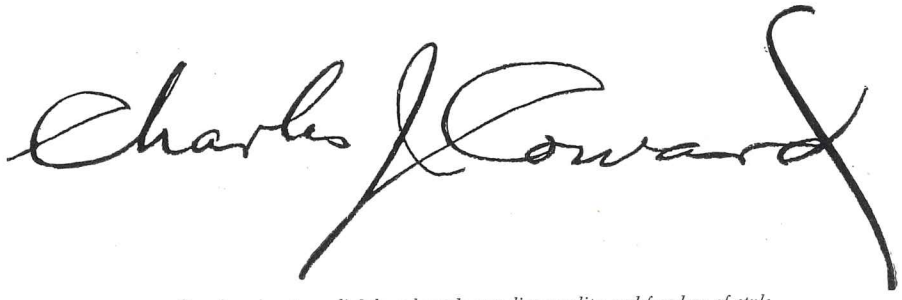
Some interesting samples of firing pin strikes. (22 cal. rim fire rifle). Shells 1 and 3 found at the scene of a crime.

The special instruments and technique in this procedure are too elaborate for description here, but extensive experiments prove that the shell of automatic fire-arms, or even non-automatic, when reloaded at the scene of the crime, always possess characteristic firing pin and breech marks that are positive trail clues reproducable only by the original arms. The examples given in Figure 6 will substantiate this point.

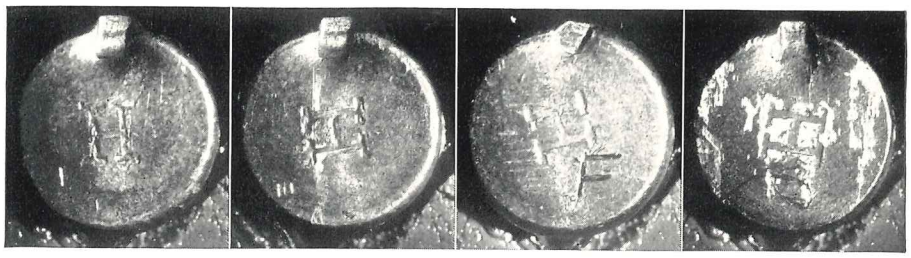
The objection is often raised by persons unfamiliar with the nature of these marks and the microscope that these lines might reoccur in evidence of unrelated nature. We quote from no less an authority than Professor Simon Newcomb, "The probability of concurrence of the events is equal to the continued product of the probabilities of all the separate events". In other words, as a thing occurs twenty times and another thing occurs once in twenty times, the probability of the two occurring in conjunction is represented by the fraction which is the product of 1/20 and 1/20, or 1/400. Therefore, if we have, let us say, eight separate characteristics occurring at the fractional differences 1/8, 1/4, 1/16 and five fractions of 3/hundredths, the probability of this reoccurring accidentally is once in 38 trillion, 400 billion times. When a reader considers that there are hundreds of these lines on each bullet, the absurdity of the objection at once becomes obvious.

Again, in the examination of handwriting the microscope becomes an indispensable tool. The nature or quality can readily be established

7a—*Genuine signature.*



7c—*Genuine signature slightly enlarged; note line quality and freedom of style.*



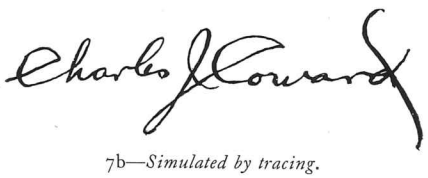
5 6 7 8

Shells 2, 5 and 6 fired from a suspect's rifle.
Shells 4, 7 and 8 fired from same make rifle, showing radically different pin marks.

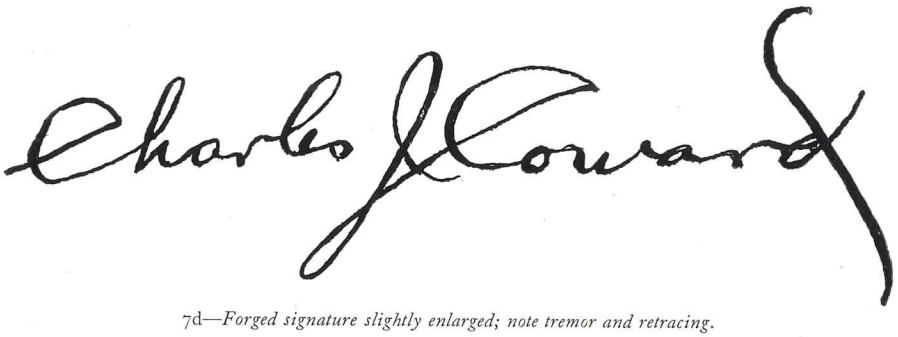
when the genuine and questioned documents are sufficiently enlarged to bring out the detail of line quality. Figure 7 represents this condition—first, a genuine signature simulated by a forgery process known as tracing. In the next two pictures the same signatures are enlarged, thus readily disclosing the spurious one. Questioned typewriting, seals, age of documents, erasures, additions, order of sequence, ink, anonymous letters, et al, all readily lend themselves to microscopic examination.

Of the miscellaneous uses of the microscope in the detection of crime the writer believes one instance will be sufficient to show its indispensability. An ordinary paper match is found at the scene of the crime, and the stub end of this match is found in the effects of a suspected individual. Careful examination will show that these two units mesh together perfectly. Further examination under high magnification will also establish the fact that the two fibers, of which each piece is composed, are of identical structure. Such evidence, of course, while not necessarily accepted by our present legal system, at least assures the police they are on the right track.

In addition to the foregoing examples, hundreds of other instances might be cited in order to show the values of different types of microscopes in detecting evidences of crime. For instance, the microscope is invaluable in the examination of human tissues involved in alkaloidal and other organic poisoning cases, in the



7b—*Simulated by tracing.*



7d—*Forged signature slightly enlarged; note tremor and retracing.*

determination of the types of inorganic poisons administered, and in the examination of scars and tissues in cases of wilful self-mutilation, which may be done to prevent identification.

In the examination of finger-prints the microscope is not particularly necessary, for an ordinary magnifying glass of 3X is, under usual circumstances, adequate to bring out such details as necessary. In certain cases, however, where only partial or indistinct prints are obtainable, the microscope again demonstrates its importance.

The particular equipment indicated in the foregoing has a range of magnifications from about 10 to 400 diameters, and for the practice of photography, of monocular type; while for direct observation only, binocular and stereoscopical microscope types are best. Different experimenters, of course, find advantages in different types or models of microscopes, but the writer has found the microscopes shown in Figure 8 are particularly well adapted to this type of work.

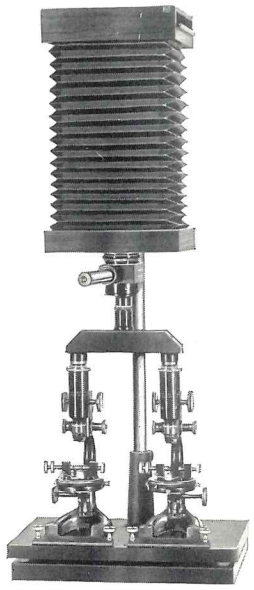


Fig. 8
Bullet-Comparison Microscope.

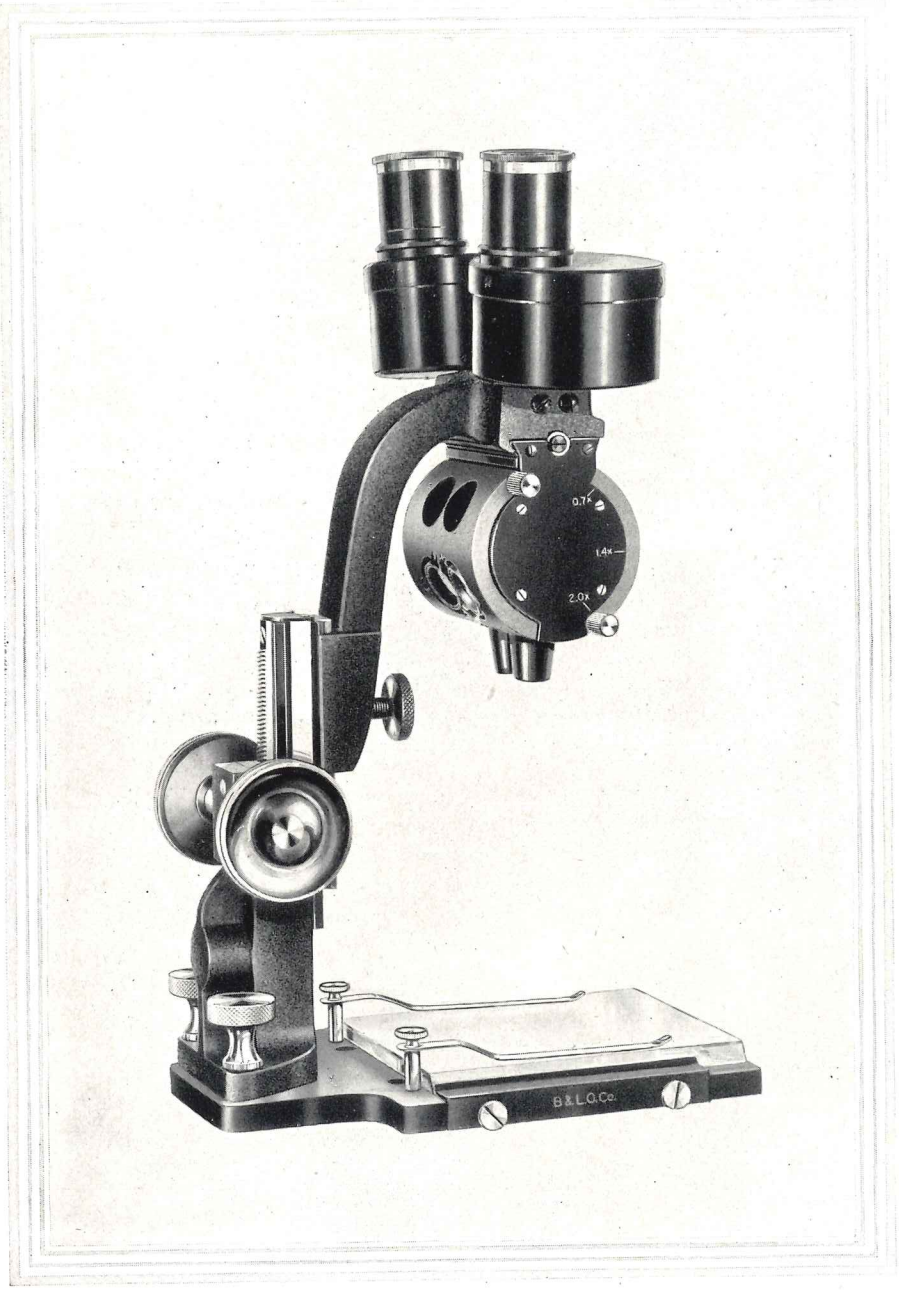
EDITOR'S NOTE: The many authorities in the diversified fields embraced by investigations, such as this article reflects, are not listed, due to the length of such a list. Any reader who wishes to go more into detail on any of the work outlined will, upon request, be furnished the reference material desired.

Instruments for Criminological Research

ON the following pages are listed the most extensively used instruments for criminological work. These instruments are built with the painstaking care and precise workmanship that characterize all Bausch & Lomb Scientific Instruments.

The Wide-Field Binocular Microscope, the Bullet Comparison Microscope and the CDE Microscope are particularly worthy of attention. These instruments are probably the three most important microscopes for this work. All of the instruments listed herein are now being used in the laboratories of the larger police departments, and are recommended by their users.

On page 36 will be found a small, but select, list of books for the reference library of the criminological research laboratory. These books cover the chemistry, photography and microscopy of criminological research work.



AKW-5 Wide-Field Binocular Microscope

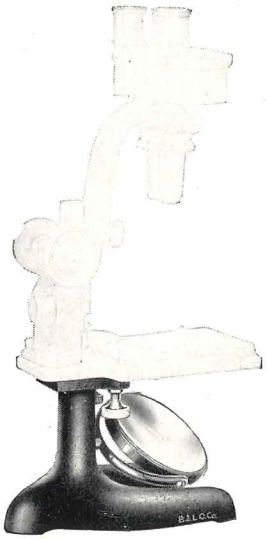
Microscope KW
Wide-Field—Binocular Vision

THIS Wide-Field Binocular Microscope is of particular value in criminological research work, because, combined with the advantage of magnification, it is the nearest approach to direct naked eye examination. This microscope is of comparatively low power with wide field and, differing from other microscopes, the image is seen exactly as with the naked eye; in other words, in stereoscopic relief and not inverted nor reversed.

The stereoscopic instrument when used to examine paper and writings, for example, shows overwriting, erasures, folds and cross lines with startling distinctness. This instrument is of particular value in the examination of bullet structure, shells, etc., that the characteristic markings of each may be found. For the preliminary examination of human hairs, animal hairs, plant fibres, string, twine, and fabrics, this microscope is a wonderful aid.

The special design of this AKW microscope makes it possible to secure a number of characteristics not found together in other microscopes of this type. The most distinctive of these characteristics are as follows:

1. Extremely Wide Field.
2. Long Working Distance.
3. High Eye Point.
4. Stereoscopic Vision.
5. The Image is not Inverted nor Reversed.
6. Instantaneous Variable Magnification with Parfocal Objectives.



KW Microscope on B Stand

Transparent specimens mounted on glass slides are readily examined with Model BKW. The plane mirror, 3" diameter, has white enameled back for reflecting diffused light.

An extremely wide field permits the examination of large areas without moving the specimen; long working distance from objective to object permits the examination of bulky objects; high eyepoint permits the observer to wear glasses, if necessary, while viewing the object; stereoscopic vision permits the viewing of the specimen in relief showing the tiny hills and valleys; and the outstanding advantage is that the object is viewed in its natural position, not inverted nor reversed as in monocular instruments.

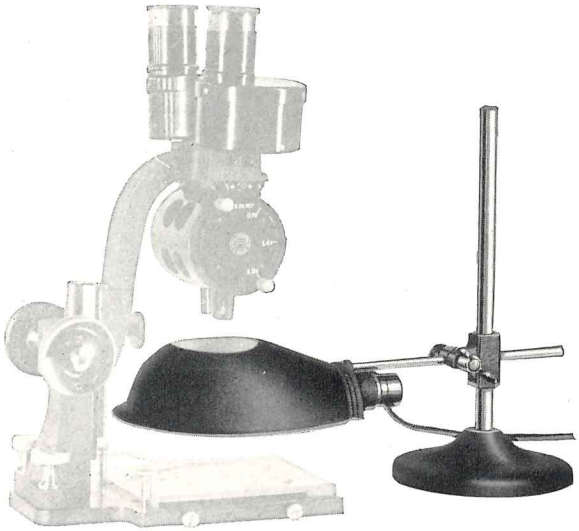
The drum nosepiece offers the use of three pairs of matched objectives in parfocal position for rapid change of magnification. The drum nosepiece slides into the objective position in place of the single pair of objectives and takes up no more space than a single pair. This is standard equipment on the AKW-5 model.

The AKW microscope is fitted with coarse focusing adjustment only, with additional slides for increasing or decreasing the space between the objective and stage. The stage is fitted with a glass platform which may be used for opaque or transparent specimens or may be removed entirely to permit the scope to be placed directly on the surface of the specimen.

A wide-field lamp, No. 1813, has been designed especially for use with this instrument and is described on page 17.

Code Word	Cat. No.	Specifications	Price
Aduhb	AKW-1	*Equipment No. 1* includes one pair eyepieces (10×) and one set of	$100.00
Adujc	BKW-1	paired objectives (0.7×), magnification 7 diameters.	115.00
Adum	AKW-4	*Equipment No. 4* includes two pairs eyepieces (10×) and 15×) and	145.00
Adunh	BKW-4	three sets of paired objectives (0.7×, 1.4×, 2.0×,) giving a range of magnification 7 to 30 diameters.	160.00
Adted	AKW-5	*Equipment No. 5* is the same as No. 4 except that the three sets of	160.00
Adtif	BKW-5	paired objectives are mounted in the Drum Nosepiece. (See No. 1072.)	175.00
Adnuc	2111	*Opal Glass Stage Plate*, extra	3.00
Adkev	1062	*Paired Objectives* 0.7×	17.00
Adkox	1064	*Paired Objectives* 1.4×	17.00
Adkuy	1066	*Paired Objectives* 2.0×	17.00
Adimd	1068	*Paired Objectives* 3.6×	18.00
Adipg	1070	*Paired Objectives* 5.8×	18.00
Aditk	1072	*Drum Nosepiece* with paired objectives 0.7×, 1.4×, 2.0×	66.00
Adlav	1154	*Paired Eyepieces* 10×	11.00
Adlew	1158	*Paired Eyepieces* 15×	11.00
Adlix	AKW	*Stand only*, in case	72.00
Admex	B	*Stand* only, no case	15.00

New B & L Wide-Field Lamp



Wide-Field Lamp

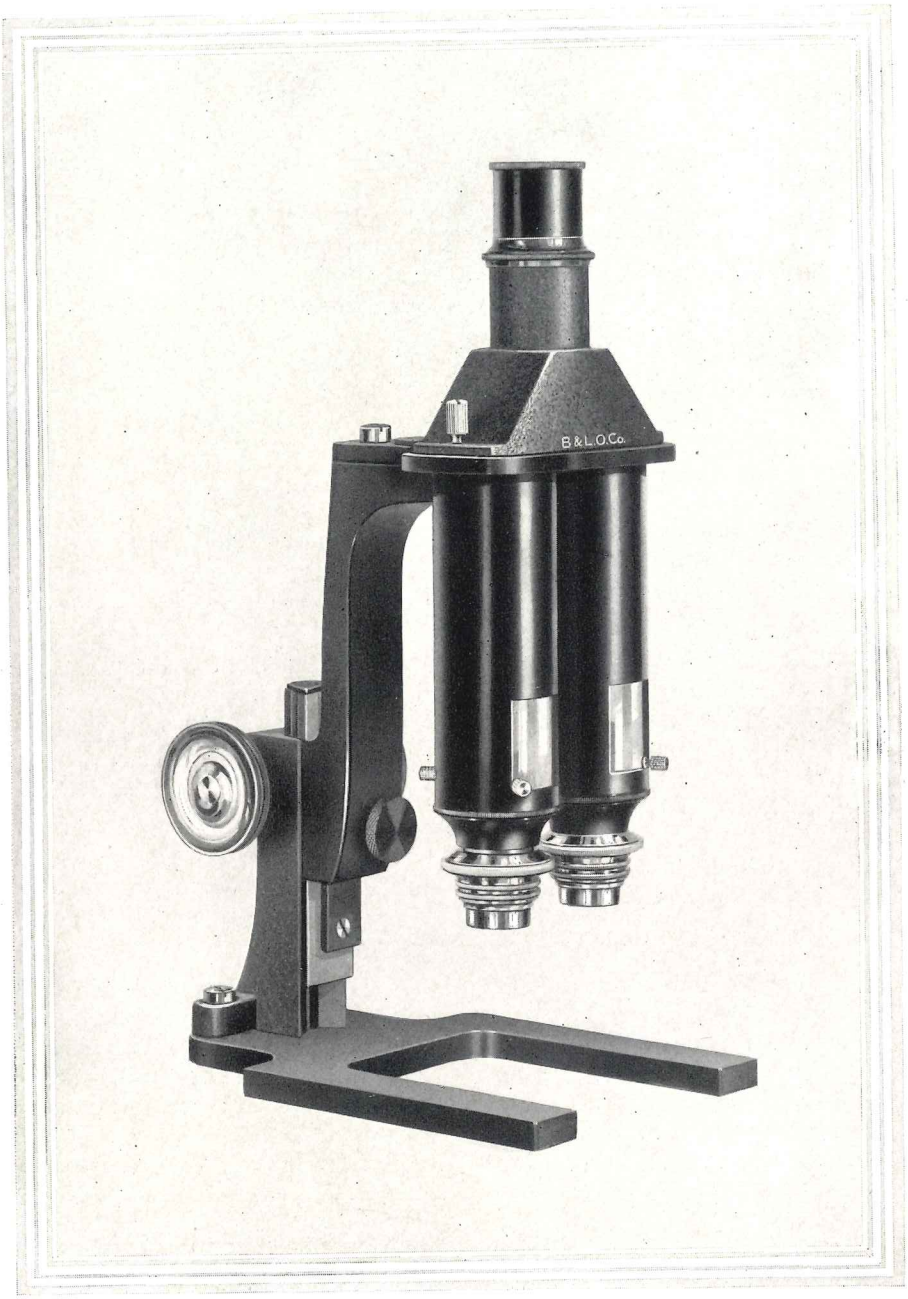
THIS lamp is the first of its kind for complete illumination of opaque objects upon the stage of a low power binocular microscope. Even though the specimen be deep and cup-like with many irregularities, this lamp, by means of its ellipsoidal reflecting surfaces, throws light into every corner and recess, eliminating all shadows.

The Wide-Field Lamp illuminates a very large field, but because of the shape of its reflector the light is all concentrated upon the stage of the microscope and no annoying reflections strike the eyes. Enough light is thrown out at the sides to illuminate a note pad or drawing paper beside the instrument in a dark or semi-darkened room.

This lamp consists of a heavy base and vertical rod upon which the lamp can be adjusted for height. The reflector is pear-shaped with a circular hole at the top through which the specimen is viewed. The light is reflected at all angles into the field of observation.

The lamp is equipped with a 6 volt, 15 candle power bulb. For alternating current a transformer must be used to step down the voltage. On direct current a resistance is required. This resistance can also be used on alternating current.

Code Word	Cat. No.	Specifications	Price
Actib	1813	*Wide-Field Lamp* with stand and 6 v., 15 c.p. bulb	$11.00
Acwec	1847	*Transformer*, for use with 6 v., 15 c.p. lamp on 110 v. A.C.	6.00
Acwid	1848	*Resistance*, for use with 6 v., 15 c.p. lamp on 110 v. D.C. or A.C.	6.00
Acvuf	1846	*Bulb*, 6 v., 15 c.p. *net*	.35



Comparison Microscope

Comparison Microscope

THE Comparison Microscope* makes possible the microscopical comparison of any two objects that can be brought within its field; they are seen in juxtaposition through a single eyepiece. It is particularly useful in laboratory work where it is desirable to compare substances, surfaces or colors under the microscope and is especially adapted to the examination of specimens for erasures, changes, and interlineations. Color differences can be recorded with accuracy by the use of special color glasses; the most delicate differences in color of ink, paper or forms of any kind are shown. Differences in texture and quality of typewriter ribbons, written and printed characters and type faces, disturbed and undisturbed paper surfaces may be readily discerned with this instrument.

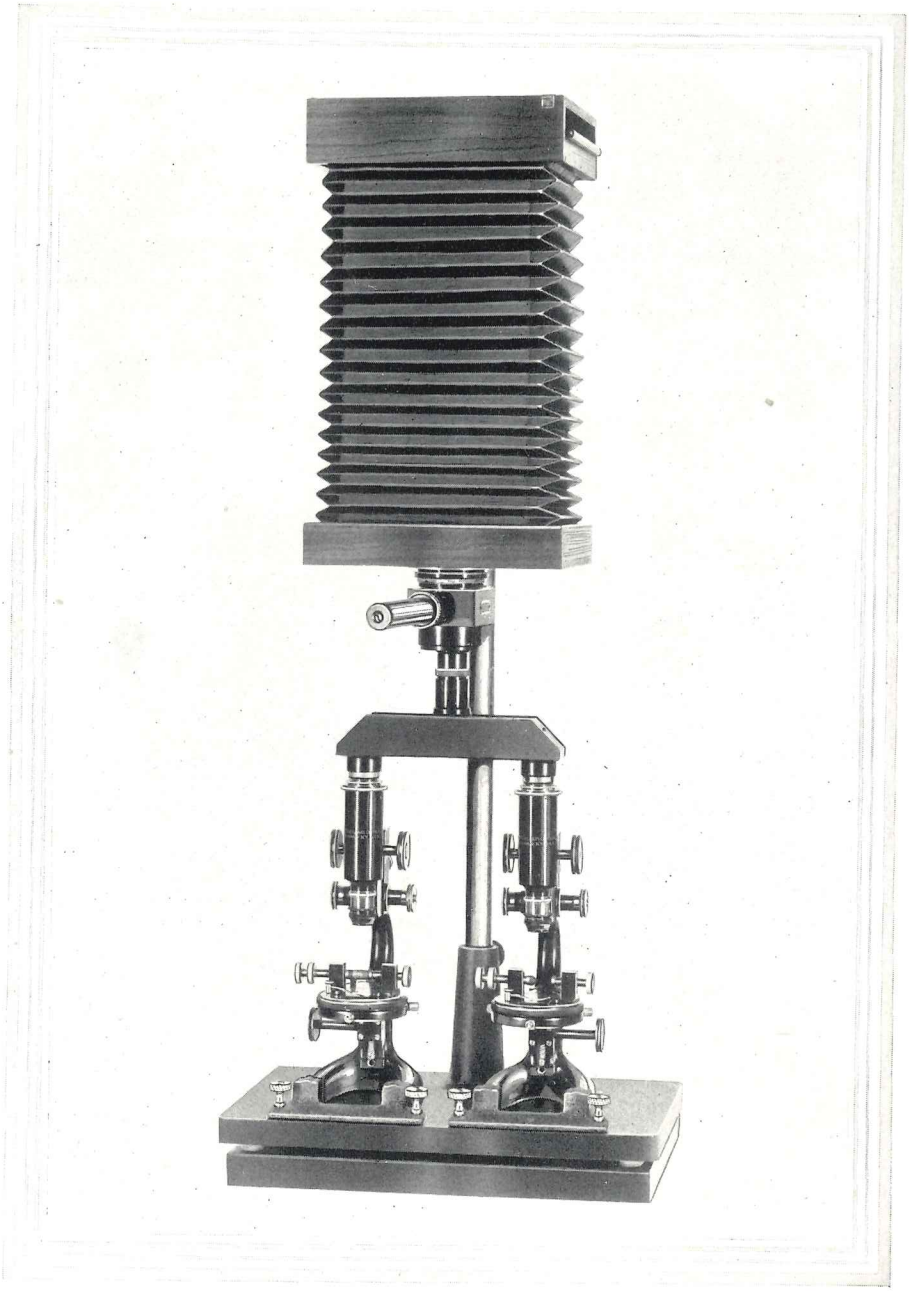
Affording, as it does, a means of accurate investigation and demonstration before court and jury, it is of extreme assistance to the examiner of disputed or questioned documents.

In the fields of study where the comparison microscope is used, it is often found desirable to use a low power wide field binocular instrument because of its property of showing the specimen in three dimensional relief. The stereoscopic instrument shows overwriting, erasures, folds and cross lines with startling distinctness.

To provide for this need, we are making the body of the comparison microscope interchangeable with No. 62 KW Binocular body (page 15). In the field of disputed documents, these two instruments are the most valuable of any.

Code Word	Cat. No.	Specifications	Price
Acfim	30	*Comparison Microscope* with two 2× (48mm.) objectives and 10× Ramsden eyepiece	$80.00
Admub	62	*KW Binocular Body* only	44.50
Adkev	1062	*Paired Objectives*, 0.7×	17.00
Adlav	1154	*Paired Eyepieces*, 10×	11.00

*Designed by Mr. Albert S. Osborn.



Bullet-Comparison Microscope

The B & L Microscope for Bullet Comparison

BY means of the Bullet-Comparison Microscope it can be quickly determined whether one bullet possesses the identical characteristics in the same sequence as the other. Bullets fired from the same gun have identical characteristic markings. A bullet known to be fired from a gun and one suspected to be fired from this same gun may be placed one on each of the stages of the Comparscope, one microscope being focused on the forepart of the heel of one bullet and the other microscope focused on the rear part of the heel of the other bullet. The comparison eyepiece is used to bring these two images into such a position that if a continuity exists of the lines on the two bullets, it will be apparent.

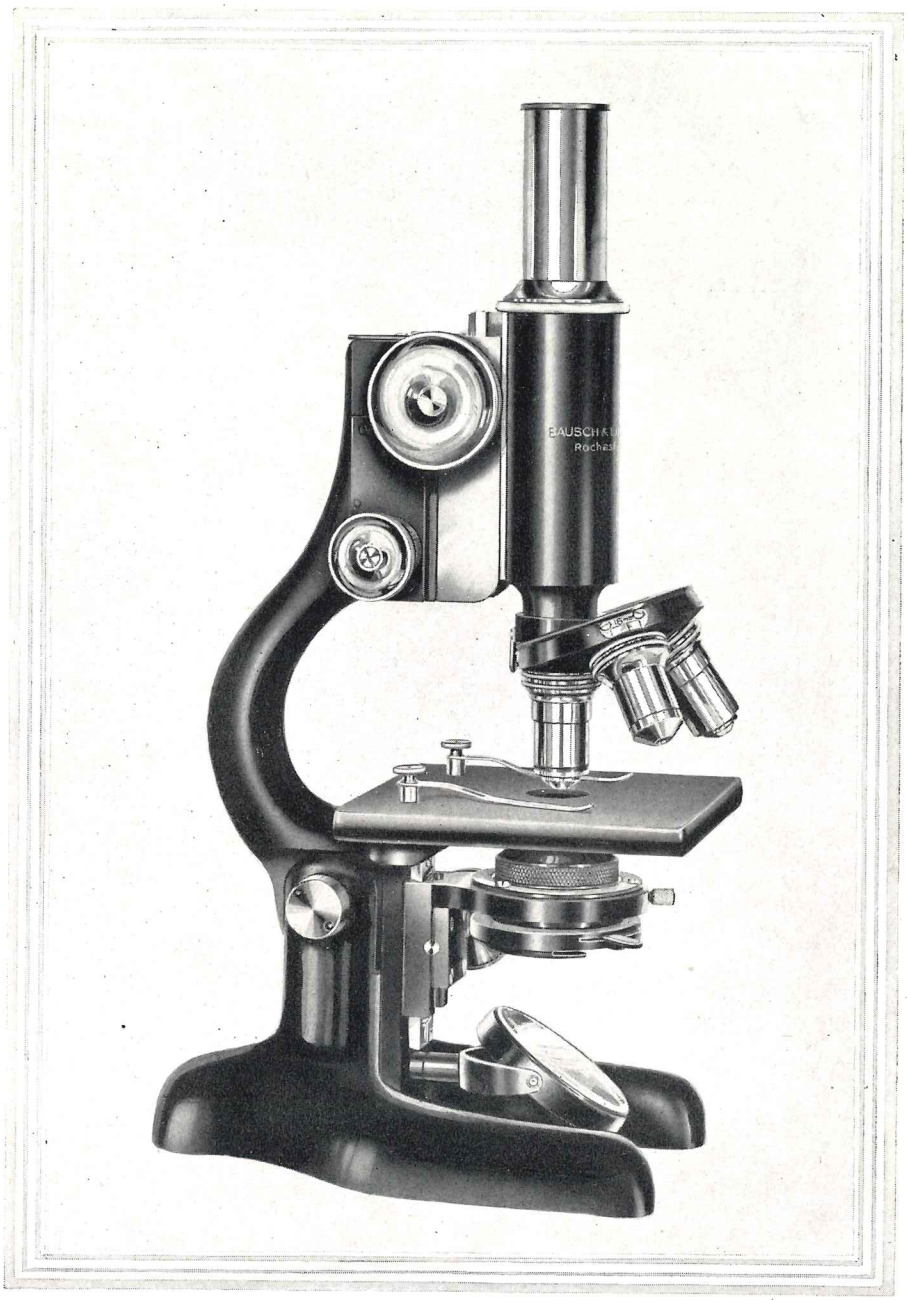
This apparatus consists of two FSM microscope stands and body tubes with special stages and Micro Tessar lenses. The stages of these microscopes are specially built, being circular and movable in two directions at right angles to each other and mounted on a rack and pinion movement so that they may be moved up and down for focusing. A comparison eyepiece is slipped over the eyepiece of each microscope and by a prism arrangement the two images are made visible in such a way that the right hemisphere represents the right half field of the right microscope and the left hemisphere the left half field of the left microscope. Between the eyepiece of this arrangement and the type H camera is fitted an observation eyepiece. By this means the camera may be set into position for photographing the two specimens and then the focusing adjustment made by viewing through the observation eyepiece. Or, if it is not desired to photograph the specimen, the camera may be swung aside, the observation eyepiece removed and the image viewed through the single eyepiece of the comparison eyepiece.

While this instrument has been built for the one specific purpose of bullet comparison, it can nevertheless be used in any instance which requires the comparison of specimens. It stands out among makeshift arrangements because of its accuracy and ease of manipulation. It is indispensible in criminological research work.

SPECIFICATIONS AND PRICES

Bullet Comparison Microscope, consisting of two Compound Microscopes, mounted on baseboard, Comparison Eyepiece, two bullet holders, matched 48mm Micro Tessar objectives, and 5X Huygenian Eyepieces, complete in case $430.50

Special 5″ x 7″ Photomicrographic Camera, mounted on vertical rod with adjustment for position of camera, and rod mounted on baseboard, equipped with Observation Eyepiece, complete 165.00



FFS Microscope

An Excellent Laboratory Microscope

THIS microscope, model FFS is of value in critical examination of specimen to detect evidences of crime. It is used in the examination of stains caused by all sort of material such as blood, rust, acid and other miscellaneous residues from liquids and assists in distinguishing one from the other. Animal blood can be examined to show the difference between it and human blood. Critical examinations of hair, fibres, fabrics, etc. can be made under high magnification with this instrument. Also microscope FFS is invaluable in the examination of human tissues involved in alkaloidal and other organic poisoning cases, in the determination of the types of inorganic poison and medicine and in the examination of tissues in cases of self mutilation done with the intent to prevent identification.

Microscope FFS is a complete microscope of a monocular type, equipped with coarse and fine adjustments, three achromatic objectives, fixed body tube, divisible Abbe condenser and rack and pinion sub-stage.

This model of microscope will prove to be quite competent for the purposes outlined above.

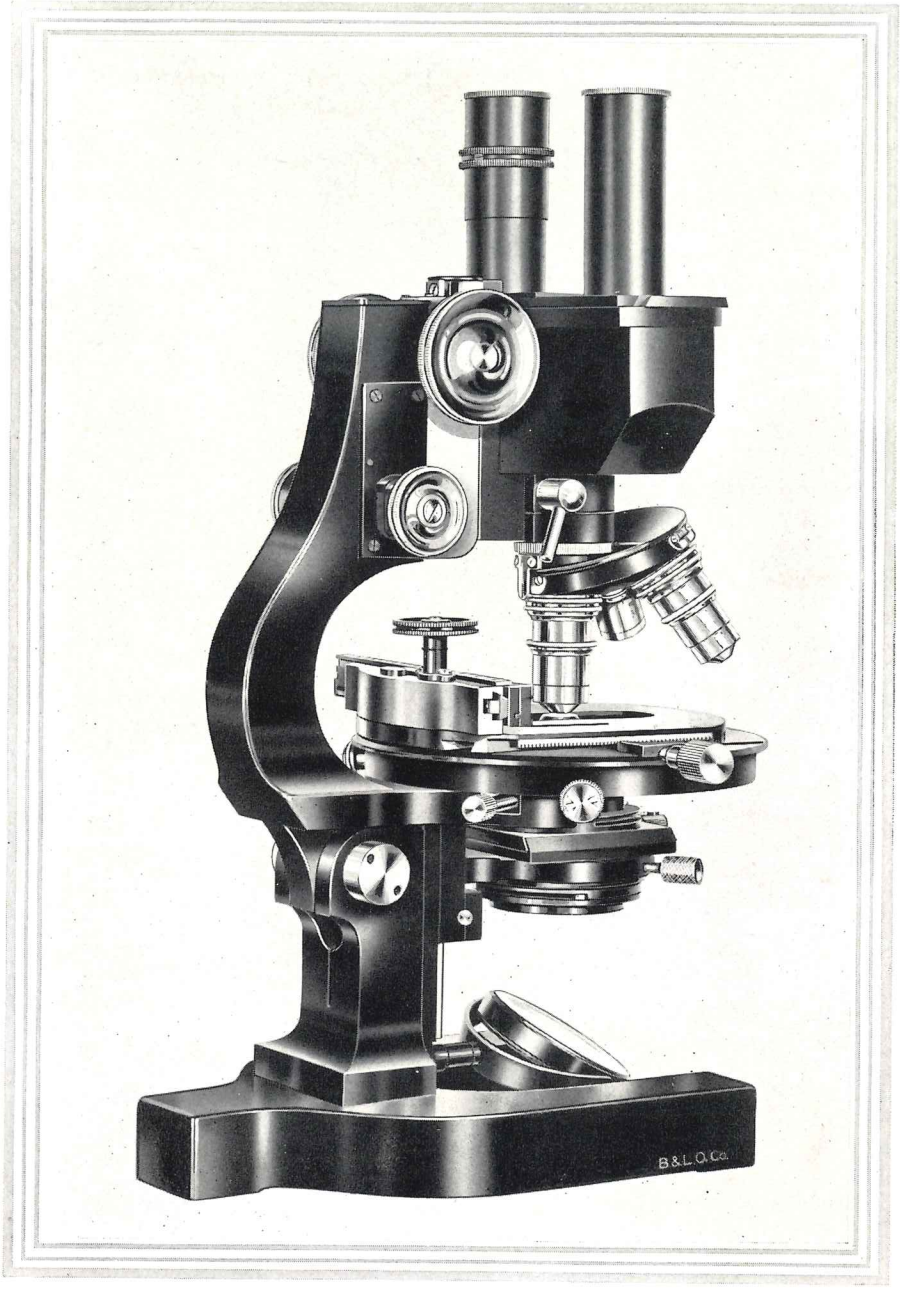
Code Word	Cat. No.	Objectives		Eye-pieces	Circular pieces	Abbe Condenser	Price
		Dry	Oil Immersion				
		Achromatic					
Abixg	FFS 6	10(16mm) 43(4mm)		5 10	Double	1.20	$ 88.50
Abizj	FFS 8	10(16mm) 43(4mm)	97 {1.9mm / 1.25}	5 10	Triple	1.20	120.00
Abjak	FFS 10	10(16mm) 43(4mm)	100* {1.8mm / 1.30}	5 10	Triple	1.20	133.00
Abfag	FFS 12	10(16mm) 43*(4mm)	100* {1.8mm / 1.30}	5 10	Triple	1.20	143.00

The objective and eyepiece numerals represent their individual magnifying powers.

*Objective is fluorite system.

No. 29 Carrying Case, extra, $2.00.

For corresponding FFSA equipment, with mechanical stage, add $15.00.



CDE Microscope

A Research Microscope

THIS research microscope model CDE is one of the finest and most completely equipped microscopes for critical examination of specimen to detect evidences of crime. It provides a means for thorough and critical examination of stains caused by all sort of material such as blood, rust, acid and other miscellaneous residues from liquids and assists in distinguishing one from the other. The difference between animal blood and human blood, differences and similarities between hairs, fibres, fabrics, etc. can be clearly and distinctly shown under high magnification with this instrument. Human tissues, involved in alkaloidal and other organic poisoning cases or mutilated with the thought of preventing identification, receive the most critical examination with this microscope.

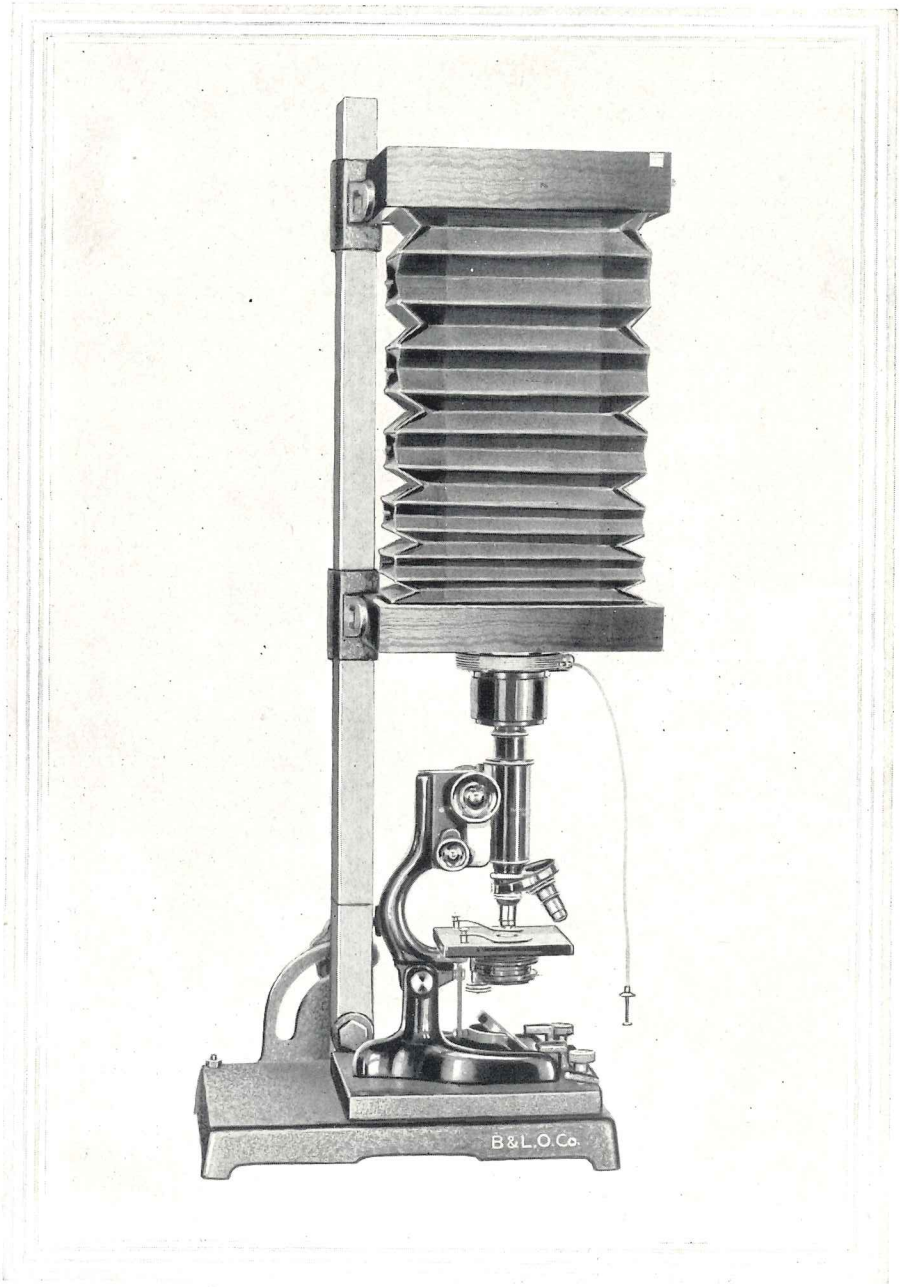
Microscope CDE is a complete research microscope of the binocular type and is equipped with a circular mechanical and centerable stage. The binocular feature affords relief from eyestrain and fatigue. The effect is as though the observer were looking into the distance and is, of course, very restful to the eyes. This means that less concentration is required on the part of the observer and enables him to give all of his attention to studying the specimen, even over extended periods of time.

Just as important as relief from eyestrain is the sense of stereoscopic effect that can be given. The object appears as in relief, thus more detail can be seen and a more accurate idea of the actual appearance of the object is secured.

With the monocular body tube in place, this instrument makes an excellent microscope for photomicrography. All in all, this CDE model is the ideal instrument for the technician and criminological laboratory.

Code Word	Cat. No.	Objectives		Paired Eye-pieces	Circular Nose-pieces	Con-denser	Price
		Dry	Oil Immersion				
		Achromatic		*Hyu'n.*		*Abbe*	
Abudp	CDE 4	10(16mm) 45(4mm)		5 10	Double	1.40	$285.00
Abufr	CDE 8	10(16mm) 45(4mm)	97 {1.9mm / 1.25}	5 10	Triple	1.40	321.50
		Achromatic and Fluorite					
Abugs	CDE 10	10(16mm) 45(4mm)	100* {1.8mm / 1.30}	5 10	Triple	1.40	334.50
Abuht	CDE 12	10(16mm) 43*(4mm)	100* {1.8mm / 1.30}	5 10	Triple	1.40	344.50
		Apochromatic		*Comp.*		*Aplan.*	
Abujv	CDE 14	10(16mm) 45(4mm)		{7.5 / 12.5}	Double	1.40	374.50
Abukw	CDE 18	10(16mm) 45(4mm)	90 {2mm / 1.30}	{7.5 / 12.5}	Triple	1.40	445.0

*Objective is fluorite system.
Aplanatic condenser, 1.40 N.A., in place of Abbe condenser, 1.40 N.A., extra, $16.50
Monobular Body Tube regularly included. If it is to be omitted, deduct $15.00.
For corresponding CCE equipmert, with plain circular stage, deduct $30.00.



Type H Camera

Photomicrographic Camera Type H

THE Type H Camera is recommended for photomicrographic work in the Criminalogical Research Laboratory because of its adaptability to different purposes. It may be used in a vertical or horizontal position and may also be used for gross photography as well as for photographing through the microscope. When in a vertical position, the camera can be swung aside to permit direct observation through the microscope eyepiece.

From the photograph (pg. 26) you will see that the camera consists of a top and bottom wood frame and a barrel connecting the frame, having an extreme extension of 24″ which can be fully utilized with the microscope in the horizontal position.

For gross photography, the "H" Camera will be found to be very satisfactory by using a Micro Tessar lens. For most of the routine photographs to be taken in this manner, the "H" Camera will be entirely suitable.

Accuracy and permanency of the alignment of the component units of any photomicrographic equipment is the important factor to consider in the purchase of such. This is particularly true where a quantity of routine work is to be handled. Bausch & Lomb standard of quality and workmanship assures you of this accuracy and permanency, so much desired, and gives you an instrument that will serve its purpose faithfully.

Code Word	Crt. No.	Specifications	Price
Caard	H-7	*Photomicrographic Camera*, as described, with camera parts for 5″×7″ plates and smaller sizes	$115.00
Caajw	4570	*Compound Shutter*	25.00
Caopg	4597-R	*Illuminating Unit* (see page 31)	38.50

Micro Tessar Lenses

THE Micro Tessar lenses, specially corrected for photomicrography, will be found satisfactory for photographing a comparatively large area of a specimen at low magnification. The lenses are corrected for use without an eyepiece and cover an angular field of approximately 55°. The 16, 32 and 48 mm lenses are provided with society screw thread, and may be used interchangeably with the regular microscope objectives. The 72 mm focus lens, supplied in a regular photographic lens mount, may be attached to the front board or shutter of the camera. It can be used also on special microscopes such as the No. 4148 Photomicrographic Microscope. For low power work and large areas we recommend our regular Photographic Tessars, and will make recommendations upon being advised regarding the requirements.

In order to facilitate focusing the Micro Tessar lenses when used for low power work, we recommended that they be used in conjunction with a rack and pinion focusing mount.

Code Word	Cat. No.	Equivalent Focus	Price
Dheft	4401	72 mm (2⅞″)	$44.00
Dhegv	4402	48 mm (2″)	36.00
Dhehw	4403	32 mm (1⅓″)	36.00
Dodox	4398	16 mm (⅔″)	25.00

When the Micro Tessar Lens or combined lens and shutter are used on the camera, we recommend that they be mounted on a rack and pinion focusing mount.

Focusing Mount and Adapters

Code Word	Cat. No.	Specifications	Price
Caasf	4588	*Rack and Pinion Focusing Mount*, fitting front board of camera, and accommodating shutters or adapters for photographic lenses	$15.00
Carer	4590	*Adapter* for fitting 72 mm Micro Tessars and photo lenses to front of shutter or focusing mount	3.50
Caeds	4589	*Adapter* for use with 4590 adapter to fit 16, 32 or 48 mm Micro Tessars to shutter or focusing mount	2.50

Special Magnifiers

Magnifier with Adjustable Stand

HERE is an instrument that has a wide range of usefulness in the criminological laboratory. It is made up in two styles, both provided with a rectangular magnifying lens which gives a wide field free from distortion.

228 Magnifier with Adjustable Standard

This lens permits the use of both eyes, thereby avoiding undue strain on one eye. The lens is attached to the adjustable arm and is always parallel to the surface upon which the support or base is placed. The arm is adjustable vertically by means of a screw head at the top of the standard.

No. 228-C is similar in operation to No. 228, but in addition it has an attachment between the arm and the lens which holds the lens at right angles to the arm. The lens may be turned on its axis and by means of a wing nut held firmly in the desired position.

228-L Shaded Illuminating Attachment

A special lighting unit No. 228-L may be easily attached to the magnifying lens. The light is shaded so that all rays are directed to the object under observation and no light may strike the eye.

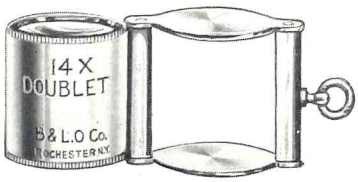
Utility Magnifier

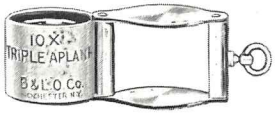
THIS is a splendid substantial instrument, particularly for use in classifying finger prints, since it has the ideal magnification for counting the number of lines between the delta and the core. Other numerous uses will, of course, be obvious to the person engaged in police work. A flat, sharply defined field of view is given. The mount is threaded for focusing.

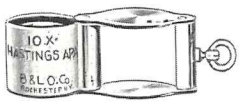
It is an ideal magnifier where extreme compactness and portability is required.

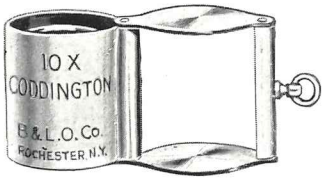
Code Word	Cat. No.	Specifiactions	Price
Lamam	228	*Adjustable Stand* with rectangular magnifying lens	$12.00
Lanet	228-C	*As above* but with right angle attachment	15.00
Lamen	228-L	*Shaded Illuminating Attachment*	6.50
Hougj	H-382	*Frosted Tubular Bulb* 115 v., 15 w. *net*	.60
Acudt	1776	*Resistance* for 220 v., D.C. or A.C.	4.25
Lamor	229	*Utility Magnifier*, 4½ ×, (35 mm lens)	8.50

Pocket Magnifiers









THE difference between the Doublet, Coddington, Triple Aplanatic, and Hastings Magnifiers, lies in their clearness and width of field. They range in order from good to best.

The Doublet Magnifiers give satisfactory results and are recommended for use whenever a good lens is wanted at a very reasonable cost.

The Coddingtons are recommended because they give good definition and a wide field, although the corrections are not of the order of the Hastings Triplet or the Triple Aplanat.

The Triple Aplanats give a large field and have a perfect correction for chromatic aberration, flatness, astigmatism and distortion. We recommend them for the higher class of work.

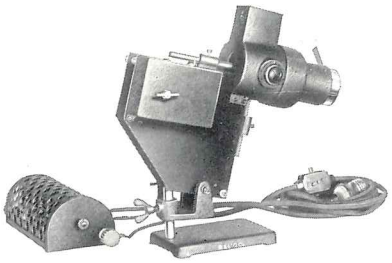
The Hastings Aplanatic Triplets are among the most perfect produced. The angle of view is very large and the working distance almost equal to that of a simple lens of the same focus.

Code Word	Cat. No.	E. F. mm	E. F. in.	Magnification	Working Distance mm	Working Distance in.	Diameter of Field mm	Diameter of Field in.	Mounting	Price
				DOUBLETS						
Labab	6	19	¾	14×	8.9	⅜	10	⅜	Hand Magnifier with Hexagonal Handle.....	$1.75
Labec	7	19	¾	14×	8.9	⅜	10	⅜	Folding Pocket Case.....	2.00
				CODDINGTONS						
Labof	163	38	1½	7×	28	1⅛	30	1 3/16	Folding Case.....	$3.00
Labug	162	25	1	10×	18.8	¾	20	13/16	Folding Case.....	3.00
Lacac	161	19	¾	14×	14.1	9/16	14	9/16	Folding Case.....	3.00
Laced	160	13	½	20×	8.4	5/16	8	5/16	Folding Case.....	3.00
				TRIPLE APLANATS						
Ladef	168	34	1⅓	7.5×	29.5	1 3/16	28	1⅛	Folding Pocket Case.....	$6.00
Ladig	167	25	1	10×	22.0	⅞	20	13/16	Folding Pocket Case.....	6.00
Ladoh	166	19	¾	14×	16.5	19/32	14	9/16	Folding Pocket Case.....	6.00
Laduj	165	13	½	20×	11.0	7/16	8	5/16	Folding Pocket Case.....	6.00
				HASTINGS APLANATS						
Laehd	173	38	1½	7×	33.6	1 5/16	30	1 3/16	Folding Pocket Case.....	$7.50
Laejf	172	25	1	10×	22.0	⅞	20	13/16	Folding Pocket Case.....	7.50
Laekg	171	19	¾	14×	16.5	21/32	14	9/16	Folding Pocket Case.....	7.50
Laelh	170	13	½	20×	11.2	7/16	8	5/16	Folding Pocket Case.....	7.50

EF—Equivalent focal length.

Microscope Lamps

Adjustable Lamp



Electric Arc Lamp

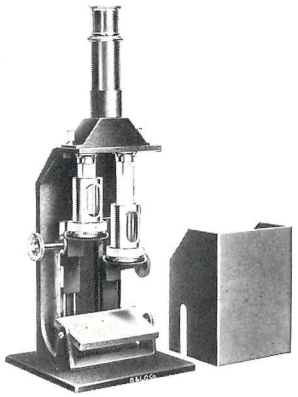
The Adjustable Microscope Lamp can be tilted to any desired angle and is adjustable for height. Condensing lens is focusable by rack and pinion. A Corning Daylight Glass is available for daylight effects. The price on four neutral tint filters to control light intensity will be quoted on request.

The Electric Arc Lamp is made in two forms—with mechanical feed for hand feed mechanism. It is recommended for all microscope work, including photomicrography. The stand is so built that the lamp may be set at the proper height and tilt. Lamp has a bull's-eye condenser in sliding tube for focusing.

Code Word	Cat. No.	Specifications	Price
Diakz	4597-CC	*Adjustable Microscope Lamp*, with inclincation joint, on support adjustable for height; spherical condenser in rack and pinion focusing mount; 200-w Mazda bulb for 110-v D.C. or A.C.	$25.00
Dhipf	4597	Same, but with 6-v, 108-w, coil filament Mazda bulb, and transformer for 110-v, 60 cycle current	35.00
Diesj	4597-R	Same, but with 6-v, 108-w, ribbon filament Mazda bulb	38.50
Dexal	4438	*Resistance* for 110-v D.C., extra	12.00
		Aspheric Condenser (substitute for spherical). extra	7.50
	4091	*200-w Bulb*, gas-filled *net*	2.35
Acuzp	1822	*6-v, 108-w Mazda Bulb*, coil filament *net*	2.50
Aczih	1824	*6-v, 108-w Mazda Bulb*, ribbon filament *net*	6.00
Dialb	4579	*Corning Glass*, with one ground surface, in frame attachable to condenser mount	5.25
Diajy	4563-A	*Ray Filter* and Corning Daylite Glass Holder	2.50
Actez	1771	*Mechanical Feed Arc Lamp* (without rheostat) with stable base, inclination joint and condenser	$45.00
Actay	1773	*Hand-Feed Arc Lamp*, including 15-foot cord and plug, but without rheostat	25.00
Detol	4452	*Rheostat*, fixed form, for 110-volts, 4.5 amperes with cord, plug and switch	11.50
Detum	4453	*Rheostat*, fixed form, for 220-volts, 4.5 amperes, with cord, plug and switch	13.50
Dezep	4472	*Cored Carbons*, $\frac{5}{16}$-in. diam., 6 in. long, per ten	.40
Dezir	4473	*Cored Carbons*, $\frac{1}{4}$-in. diam., 6 in. long, per ten	.40

Special Instruments

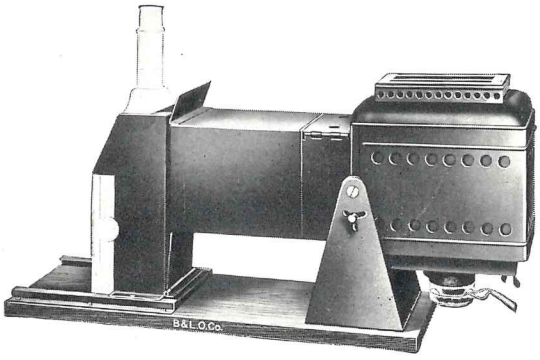
AS criminological research progresses many other scientific instruments are put to use. The Colorimeter, the Nephelometer, the Fluorescence Microscope, the Euscope, Micro-Projectors and Photomicrographic Apparatus, etc., are being used now in the larger laboratories of Police Departments. Due to the many different models of these instruments we are showing a typical model of each line and for those who desire complete information we will send detailed information on the entire line in which you are interested. We will gladly cooperate with you in choosing an instrument particularly for use in the special work which is to be done.



The Colorimeter

The Colorimeter is of utmost value in the determination of chemical fluids. Analysis can be made quickly and accurately. We will gladly give you complete information on the entire line that you may pick the one best suited to your needs.

The Nephelometer

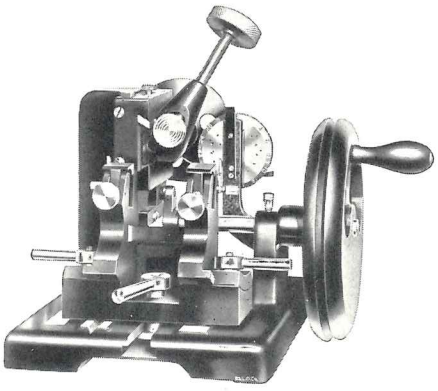


The Nephelometer is of value when it is necessary to analyze chemical fluids by turbidimetric measurements rather than by color matching. Two models are available. Write for detailed information.

The Spectometer

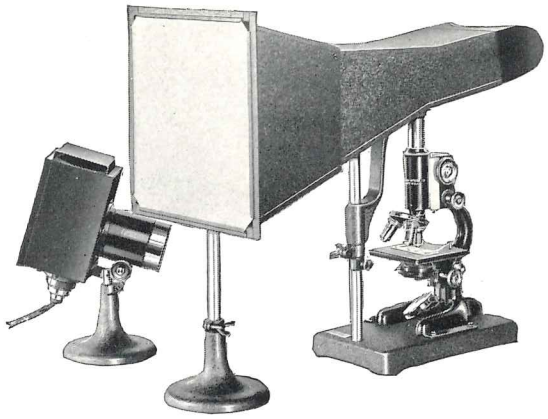
THE Spectrometer is used in the analysis of fluids, poisons etc. by photographing the spectrum and identifying the lines contained therein. It is one of the most accurate qualitative methods known as even the faintest trace of poison, which by other methods would not be detected in a liquid, is revealed by this method. There are several models available at various prices; write for complete information.

The Microtome



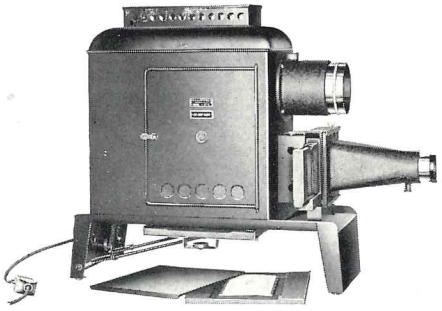
The Microtome will slice the specimen of flesh, bone or other material so thinly that it can be placed under a microscope and critically examined under high magnification. Several models are available. Write for complete information on them all.

The Euscope



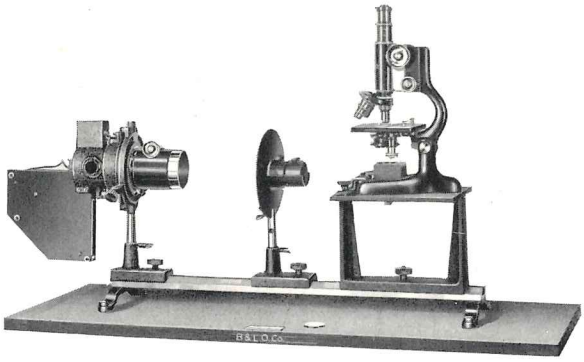
The Euscope is of value because of three reasons. For the individual observer it makes possible continued observation over long periods of time without fatigue or eye strain; it permits small groups to observe microscopical specimens which are projected onto a ground glass screen at the viewing end of the Euscope; and it permits photomicrographs to be made for routine work. Write for complete information on this Euscope.

The Balopticon



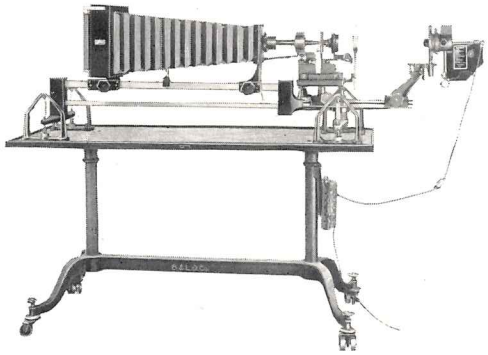
For lectures and teaching of criminological research the Bausch and Lomb Optical Company provides the finest in projection equipment. Many special models are available for daylight projection, projection in semi-darkness, and for projection in total darkness. Balopticons are available for both opaque and lantern slide projection. Write for complete information on these instruments for use in your work.

Fluorescence Microscope



The Fluorescence Microscope is becoming of great value to the criminological expert. It provides a means of obtaining Ultra-violet light by means of which it is possible to determine, for example, whether or not seals have been broken and then fused together to appear like the original. The material of which the seal is composed will fluoresce differently at the point of breakage than it does elsewhere. Complete information on this instrument and the technique of its use will be gladly sent to you upon request.

Photomicrographic Apparatus



Many models of the Photomicrographic Apparatus are made by Bausch & Lomb. It is of great value when specimens are to be photographed up to 6000× magnification. Complete information on these models will be gladly sent to you.

Books for Your Reference Library

Micro-Chemistry of Alkoloids . . . . . by Stephenson

Tests & Reagents . . . . . by Alfred C. Cohn

Technical Methods of Analysis . . . . . by Roger C. Griffin

Detection of Poisons . . . . . by Autenrith & Warren

Photography as a Scientific Implement . . . . . by Blackie

Pathological Technique . . . . . Mallory & Wright

Questioned Documents, 2nd Edition . . . by Albert S. Osborn

We suggest the American Journal of Police Science as a magazine worthy of your most careful attention. It contains excellent information on police and criminological methods.

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